



# Indian Institute of Technology

## Course Details Report

**Course No: MA2102**

**Course Name: Differential Equations**

**Course Type:**

Theory

**Description:**

To introduce to the students the methods of standard Ordinary Differential equations and Partial Differential Equations

**Course Content:**

Ordinary Differential Equations: Geometrical meaning of a first order ODE, First order exact equations, integrating factors, first order linear equations, homogeneous linear equations with constant coefficients of higher order, non-homogeneous linear equations with constant coefficients of higher order, linear independence of solutions and Wronskian, complex roots and repeated roots of characteristic equation, solution of non-homogeneous equations using Method of variation of parameters. Series solution of ODE: Power series method, Legendre's equation, Orthogonality of Legendre polynomials, Frobenius method, Bessel's equation, Orthogonality of Bessel functions, Partial differential equations: First order equations using Lagrange's method, classification of second order equations, D'Alembert's solution of wave equation, solutions of heat equation, wave equation and Laplace equation (Cartesian coordinates) using separation of variables.

**Text Books:**

E. Kreyszig, Advanced Engineering Mathematics, 10th Ed., John Wiley & Sons, 2010

**Reference Books:**

1. W.E. Boyce and R.C. DiPrima, Elementary Differential Equations, 7th Ed., John Wiley & Sons, 2002.
2. S.J. Farlow, Partial Differential Equations for Scientists and Engineers, Dover, 2006.
3. N. Piskunov, Differential and Integral Calculus Vol. I & II, Mir Publishers, 1974.